Highly Specific Approach for Detection of Salivary Biomarkers of Zika Fever

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Technology description

Background

Clinical symptoms of zika fever are non-specific. In pregnant women, ZIKV (zika virus) could cause fetal microcephaly. In addition, ZIKV not only appears to severely harm unborn children but is also hurting the economies of many South and Central American countries. For instance, The World Bank calculated that the global economic cost of ZIKV was more than US$3.5 billion in 2016. There is no immediate clinical change upon infection and to date, the time of initiation of the illness is highly subjective. Laboratory detection of zika fever is challenging because there is no "gold standard" diagnostic tool for both acute and convalescent stages. For example, RT-PCR in blood is only useful in the acute stage since viral RNA can be identified in the early days (first 5- days post infection) of this illness. Also, classical diagnostic methods based on immunoassay have significant cross reactivity with other Flaviviruses, in both acute and convalescent stages, that limits the use of this type of approach. Saliva is attractive for monitoring parameters of health/disease conditions due to its multiple component contributors. Advances in clinical proteomics, specifically the emergence of mass spectrometry technologies make possible the ability to discover multiple protein/peptides biomarkers simultaneously and provides a powerful diagnostic tool. The use of saliva for viral infection diagnosis is an area with recent significant development due to different investigational approaches, where, instead of searching for biomarkers of host origin, these studies explore the identification of biomarkers originating from the virus.

Description of the Invention

This technology is aimed at exploiting the use of saliva for the diagnosis of Zika fever. The identification of multiple ZIKV protein biomarkers in saliva provides a powerful diagnostic tool that can overcome the challenge of cross reactivity with other Flaviviruses when only a single protein is being detected. In addition, this technology is based on a classical biochemical concept where proteins and peptides are more resistant to degradation than DNA and RNA in saliva, consequently increasing the window of detection of biomarkers for Zika infection. Hence, a MSbased test on patient saliva may be an immediate option as a diagnostic test. This type of diagnostic assay could be implemented in regional test sites with minimal development time. Data has been generated showing detection of Zika-specific peptides by mass spectrometry-based proteomics (MS) in saliva from individuals that were clinically diagnosed with Zika infection (14 days prior to saliva collection). This approach increases the window

(> 30 days post infection) of ZIKV detection when compared to RNA-based diagnostics (<5 days post infection). A rapid lab-on-a-chip POC salivary diagnostic test for Zika detection is currently being developed which could be used as a first line patient screening tool in remote areas with a ZIKV epidemic.

Publication:

Zuanazzi D, Arts EJ, Jorge PK, Mulyar Y, Gibson R, Xiao Y, Bringel Dos Santos M, Machado M, Siqueira WL. 2017. Postnatal identification of zika virus peptides from saliva. J Dent Res. 96(10):1078-1084.

Advantages

• Non-invasive and straightforward sample collection
• No requirement for refrigeration or storage solution
• Rapid, automated, and batched testing on MS immediately upon sample receipt
• Overcomes cross reactivity with other Flaviviruses
• Increases the window of detection of biomarkers for Zika infection
• Potential for use in other Flaviviral diseases (i.e. West Nile and Dengue) that have similar diagnostic challenges

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